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ABSTRACT

This study examined factors contributing to under- and over-achievement in first-year college students at York University in Ontario (Canada). The difference between predicted and actual first-year grades of a sample of 1,229 students entering York University in 1994 was examined on the basis of information obtained from administrative records, a mailed survey carried out before the start of classes, and a mailed survey completed at the end of the first year. Overall, students were likely to receive lower than expected grade point averages (GPAs) if they had high Ontario Academic Credit (OAC) marks, were in science, believed at the beginning of the first year that family problems would interfere with their studies, or were employed. Students likely to get higher than expected GPAs were in environmental studies, were highly involved in their classes, and earned relatively high numbers of course credits. (Contains 17 references.) (MDM)

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INSTITUTE FOR SOCIAL RESEARCH

UNDER- AND OVER-ACHIEVEMENT IN FIRST YEAR

WORKING PAPER

J. PAUL GRAYSON

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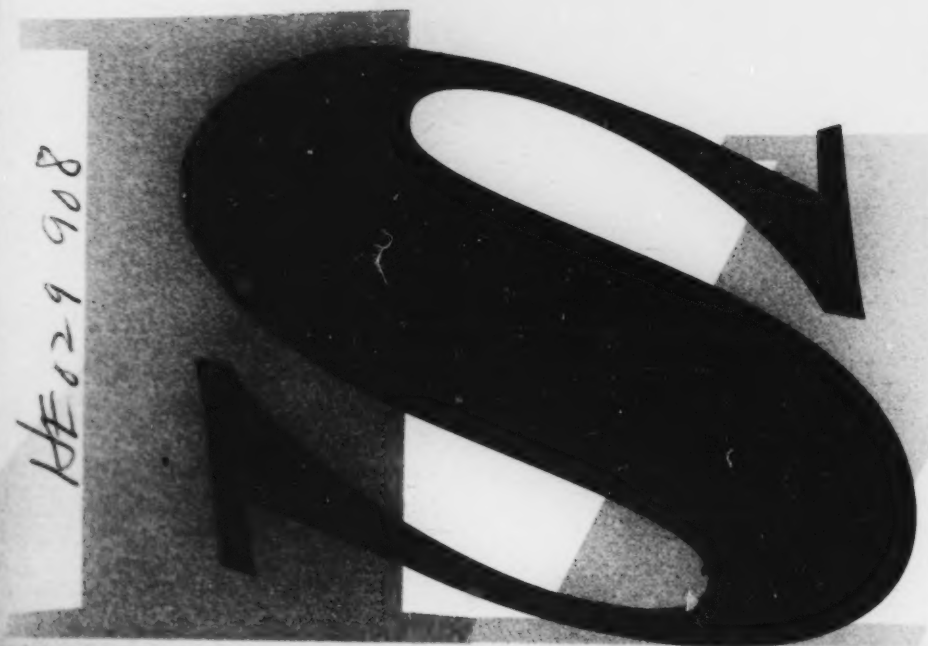

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The following is a working paper.

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Gordon Darroch, David A. Northrup and Mirka Ondrack (1989)

Summary

The difference between predicted and actual first year grades of a sample of 1,229 students entering York University in 1994 was examined on the basis of information obtained from administrative records, a mail survey carried out in the Summer of 1994 prior to the commencement of classes, and a mail survey completed at the end of the first year in the Spring of 1995. Overall, students were likely to receive lower than expected GPAs if they had high OAC marks, were in Science, believed at the beginning of the year that family problems would interfere with studies, and were employed. Students likely to get higher than expected marks were in Environmental Studies, were highly involved in their classes, and earned relatively high numbers of course credits.

Introduction

In Ontario, the majority of students are admitted to university on the basis of their Ontario Academic Credit (OAC) marks. Although research carried out in both Canada and the United States suggests that high school marks may be better than the results of standardized tests in predicting educational achievement at the university level, there is a growing demand in the province for the latter. Within this context this report examines the differences between first year grade point averages (GPA) predicted on the basis of OAC marks and actual GPAs for a sample of 1,229 students who entered York University in 1994. The extent to which the characteristics, self-evaluations, and experiences of students affect this relationship will be of particular concern.

After a short review of the literature on the predictive validity of high school marks, the report will focus briefly on the amount of variance in first year GPAs explained by OAC marks. Then the characteristics and experiences of students that affect the relationship between predicted and actual marks will be examined. Finally, a regression analysis will be used to summarize the overall relationships among OAC marks, students' characteristics, self-evaluations and experiences (independent variables), and differences between predicted and actual GPAs (dependent variable).

Predictors of GPA

In a 1993 review of 36 studies carried out in the United States on the relations between predictors of GPA and actual GPA, Mouw and Khanna distinguish between *traditional* predictors such as high school marks and the results of standardized tests (like Scholastic Aptitude Tests - SATs) and *non-traditional* predictors such as demographic and attitudinal variables. The median variance in GPA explained by traditional predictors is 28% (p. 332). Mouw and Khanna conclude that the addition of non-traditional variables, such as social class, personality traits, and attitudes toward the academic environment, results in only marginal increases in explained variance in GPA (p. 333).

Astin (1993) comes to a conclusion similar to that of Mouw and Khanna regarding the variance in GPA that can be explained by easily obtained admissions data. In addition, he notes that the predictive validity of high school grades is different from that of standardized tests.

> Hundreds of studies using various measurements and methodologies have yielded similar results: college grade point averages can be predicted with modest accuracy [explained variance around 30%] from admissions information. The two most potent predictors are the student's high school GPA and scores on college admissions tests. Grades almost

always carry more weight than tests.

In his own examination of 38,587 students who first entered 478 American institutions of higher learning in 1985 Astin found that high school marks combined with the results of SATs explained approximately 25% of the variance in GPA; however, grades had twice as much influence as SAT results (p. 188). Astin also examined the impact on GPA of demographic and attitudinal variables such as gender, race, socio-economic status, self-ratings of academic and writing ability and drive to achieve. Each was found to have a positive effect on GPA; however, the effects of being Mexican American and being a non-citizen were negative (p. 189).

Astin also observed that certain 'involvement' activities, such as hours per week talking to faculty outside of class, positively affected GPA while others, like belonging to a fraternity or sorority and working full-time had negative implications for GPA (p. 190).

Overall, Astin finds that approximately one third of students receive university grades that are comparable to those earned in high school; about one fifth obtain higher grades in university; and nearly a half of students get lower grades in university than in high school (p. 188).

The fact that tests such as SATs explain less variance in GPA than high school marks or that standardized tests are relatively poor predictors of first year grades has been found in other studies (Baron & Norman, 1992; Hudson, McPhee, & Petrosko (1993). Others (Fuertes & Sedlacek, 1994) have found SATs to be reasonably predictive of grades but not of retention.

Researchers have also noted that the predictive value of various measures varies by gender and race. For example, Pennock-Roman (1994) noted that high school marks were better predictors of first year grades for men than for women. Similarly, Stricker, Rock, & Burton (1993) found that the results of SAT scores under- predict the first year grades of women and over-predict those of men. With respect to race, Pennock-Roman (1992) observed that high school grades and SAT scores were of greatest utility in predicting the marks of Asian Americans and of least value in predicting the grades of Blacks. Pearson (1993) found that SAT scores under-predict the first year grades of Hispanics.

While Stricker, Rock, & Burton (1993) observed that SAT scores were better predictors of first year grades for male than female students, they also discovered that gender based differences in prediction were reduced if self-assessed academic preparation, studiousness, and attitudes to math were considered. Likewise, Young (1993) concluded that non-traditional predictors like

motivational and personal qualities may be of more value than high school grades in predicting marks in diverse student bodies. In Wolfe's and Johnson's (1995) study the greatest amount of variance in GPA, 19%, was explained by high school grades; however, self control accounted for an additional 7% to 9% in the variance while SAT scores explained an additional 3% to 5%. The importance of non-cognitive variables in predicting GPA was also noted by Ancis and Sedlacek (1995).

In specific subject matter areas, such as mathematics, further evidence is given of the predictive value of non-traditional predictors of grades. For example, House (1995) observed that self-rated math ability was a better predictor of grades in a finite math course than American College Test (ACT) scores and number of years of high school math. Likewise, Rech and Harrington (1994) found that in an intermediate algebra course, out of ACT math scores, the Mathematics Placement Exam score, class attendance, age, gender, and race, only attendance predicted course grades.

Research conducted in Canada is consistent with the noted relationships between high school marks and GPAs in the United States and suggests that standardized tests are, and former grade 13 departmental examinations were, no better predictors of university grades than high school marks. In a review of the Canadian literature Allan et al (1983:41) refer to studies in which it is noted that the best predictors of university performance were grade 13 marks (now OAC marks) and that the additional explanatory value of SATs was marginal. Of equal importance are studies cited by Allan et al indicating that grade 13 marks were as valid indicators of first year university performance as former grade 13 departmental examinations (p. 42). Finally, in studies carried out at McMaster University variance in first year grades explained by grade 13 marks ranged from a high of 46% in natural sciences to a low of 29% in business (p. 42).

Overall, these studies indicate that in general high school marks are better predictors of first year marks than the results of standardized tests. Nonetheless, each may under- or over-predict the performance of particular groups such as females and certain minority group members. In some instances, additional non-cognitive measures, such as positive attitudes, contribute to the prediction of grade point averages.

Student Involvement

In addition to predictors discussed thus far, a substantial body of literature shows that certain university experiences may contribute to desired university outcomes, such as high academic achievement (Pascarella & Terenzini, 1991; Astin, 1993; Kuh, 1995). (Obviously, at entry, whether or not students will actually have such experiences is unknown.) Most important are out-of-class

contacts with faculty and academic and social involvement. Activities classified as academic involvement include participation in events, such as special seminars or lectures, not required by the formal curriculum. Social involvement includes formal activities such as belonging to campus clubs and participating in organized sports and informal activities such as socializing with university based friends, watching sports and cultural events, and so on. Whatever the case, as Kuh (1995:125) states in elaboration of the idea of involvement, "the more time and energy students expend in educationally purposeful activities, the more they benefit." At York University it has been shown that various forms of student involvement explain 3.6% of the variance in first year GPA; however, classroom involvement alone accounts for 2.6% of this total (Grayson, 1997).

The Sample

Information for the study of differences between predicted and actual grades of first year students at York University was collected from two mail surveys and administrative records. The first survey was conducted in the Summer of 1994 and included 1,798 students from all faculties at York who were entering first year (response rate approximately 83%). Except in the vary large Faculty of Arts, from which a random sample was drawn, all entering students were involved in the survey. The second survey, conducted in the Spring of 1995, focused on all participants to the first survey and an additional random sample from Arts. In total, 1,869 students responded to the second survey (response rate of approximately 65%). The information presented in this report is based on the responses of 1,229 students who participated in both surveys and from information on OAC marks, GPA, and completed credits stored in administrative records.[1]

Variance in GPA Explained by OAC

Information on OAC marks, GPA, and the amount of variance in the latter explained by the former is summarized in Table 1. For all faculties combined, OAC marks explain 34.1% of the variance in GPA (31.9% if data are weighted to adjust for sampling procedures). There is, however, considerable difference from faculty to faculty. For example, in Administrative Studies OAC grades

[1]As the vast majority of first year undergraduates enrol in the Faculty of Arts, weighting the survey data on the basis of faculty would result in a sample that primarily reflected the characteristics etc. of Arts' students. As a result, unless otherwise indicated, non-weighted data were used in analysis; nonetheless, as in the final regression analysis faculty of enrolment is entered as a dummy variable, the impact of faculty of enrolment on differences between predicted and actual grades is taken into account.

Table 1: OAC, GPA, and Regression of GPA on OAC for 1994 Cohort (Administrative Records)

	(1) Mean OAC Marks	(2) Std. Dev. for (1)	(3) Mean GPA	(4) Std. Dev. for (3)	(5) b for GPA on OAC	(6) Std. Error for (5)	(7) Variance in GPA Explained by OAC	(8) Sig. of t for (5)	(9) Total Cases
All Faculties	79.8%	6.3	5.5	1.7	.16	.01	34.1%*	.000	1229
Environmental Studies	80.7%	4.8	6.2	1.5	.15	.03	35.6%	.000	57
Fine Arts	80.2%	5.9	5.8	1.4	.11	.01	22.5%	.000	231
Administrative Studies	87.6%	3.3	7.1	1.1	.14	.03	16.4%	.000	91
Science	80.9%	6.4	5.0	1.9	.21	.02	43.1%	.000	275
Arts	77.7%	5.5	5.2	1.6	.16	.01	27.7%	.000	418
Glendon	77.8%	6.8	5.6	1.6	.13	.01	40.3%	.000	157

*31.9% if sample weighted to adjust for sampling procedures.

explain only 16.4% of the variance in GPA; for Science the figure is 43.1%.[2] The overall variance explained by OAC marks, and differences in explained variance from one faculty to the next, are comparable to differences reported in other studies.

Differences Between Predicted and Actual Marks

An overall measure of the difference between predicted and actual marks is provided by the residuals of the regression of GPAs on OACs. For all faculties combined, the residuals have a mean of .08, a standard deviation of 1.4, and maximum and minimum values of 4.2, and -5.9 respectively. A correlation between residual scores and number of completed credits (mean = 26.47, S.D. = 4.65) of .302 (sig. .01) suggests that in part the same unknown factor explains each.

For purposes of this section of the report, students with a residual score less than -.49 were arbitrarily defined as performing lower than expected in terms of GPA; those with a residual between -.49 and +.49 were defined as performing as expected; and students with residual scores above .49 were categorized as performing better than expected. When classified in this way, 28.7% of first year students can be viewed as performing at a lower than predicted level in terms of first year GPA, 41.9% as performing at a higher than expected level, and 29.4% obtained grades consistent with predictions. (When data were weighted to reflect sampling procedures the relevant figures were quite comparable: 29.2%, 41.8%, and 29.0%.)

Factors Affecting Residuals

Consistent with the literature reviewed earlier, factors having a potential impact on residual scores include the following:

1. pre-university characteristics such as gender, age, and racial origin;
2. faculty of enrolment;
3. self-assessments of abilities prior to university entrance;
4. involvement in various university activities;
5. and hours per week in employment.

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[2]Explanations for differences such as these are beyond the scope of the current report. It seems clear, however, that a university science education more than an eduction in, for example, administrative studies builds on subjects taken in high school. As a result, it is reasonable to expect that OAC marks would be a better predictor of GPA in Science than in Administrative Studies.

With the exception of racial origin, variables falling in categories 1 and 2 are known prior to enrolment. Information on racial origin and variables in the remaining categories can only be obtained through surveys.

In terms of the logic of the analysis to follow, it is important to note that there is a temporal sequence to categories 1 through 5. With the exception noted, information in categories 1 and 2 is collected first and can be obtained from administrative records. Racial origin and self-assessments derive from the survey carried out in the Summer prior to enrolment; and information on involvement and hours per week in employment is obtained from the survey conducted in the Spring of the first year. As a result, analysis will deal with each of the categories sequentially.

Pre-University Characteristics

Pre-university characteristics to be analysed in this report are age, gender, parental education, and racial origin. In the literature cited earlier each has been found to have a potential impact on GPA.

There is a slight yet statistically significant negative correlation of -.085 (sig .01) between residual scores and age (mean = 20.23, S.D. = 1.17). Older students are slightly less likely than younger ones to do better than predicted on the basis of their OAC marks.

Information on gender, parental education, and racial origin as collected in the Summer of 1994 survey can be found in Table 2. An examination of these data indicates that while the mean residual scores of males (.12) are higher than those of females (.05), the difference is not statistically significant. Similarly, although the residual scores of students coming from families in which at least one parent had at least some college or university education (.11) are higher than those for whom neither parent had this educational advantage (.04), differences are not statistically significant.

Differences in residual scores based on racial origin are statistically significant and of considerable magnitude. While the scores for Blacks and students of Chinese and 'other' origins are -.06, -.29, and -.13 respectively, those of students of South Asian and European origin are .46 and .17. A Scheffe multiple range test, however, indicates that only the differences between students of Chinese and European origin are statistically significant (F sig. = .02).

Faculty

From Table 3 it is evident that differences in residual scores based on faculty of enrolment are also statistically significant and of considerable size. Whereas the

Table 2: Pre-University Characteristics (Summer, '94)

		Mean of Residuals	Std Deviation	Valid N
Gender	Female	.05	1.29	N=782
	Male	.12	1.42	N=423
Group Total		.07	1.34	N=1205
Highest Parental Education	LT College/Univ	-.04	1.32	N=446
	At Least Some College/Univ	.11	1.32	N=685
Group Total		.09	1.32	N=1131
Racial Origin***	Black	-.06	1.46	N=63
	South Asian	.46	1.37	N=28
	Chinese	-.29	1.40	N=111
	Other	-.13	1.50	N=126
	European	.17	1.27	N=831
Group Total		.09	1.33	N=1159

*Sig F < .05; **Sig F < .01; ***Sig F< .001

Table 3: Residuals by Faculty Affiliation (Administrative Records)

		Mean of Residuals	Std Deviation	Valid N
Faculty***	Env Studies	.63	.89	N=57
	Fine Arts	.33	1.23	N=229
	Admin Studies	.44	.96	N=91
	Science	-.59	1.49	N=275
	Arts	.08	1.33	N=418
	Glendon	.50	1.09	N=140
Group Total		.08	1.34	N=1210

*Sig F < .05; **Sig F < .01; ***Sig F< .001

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mean difference between predicted and actual GPA for students in Environmental Studies is .63, the figure for students enrolled in Science is -.59. A Scheffe multiple range test indicates that differences between the residual scores for students in Science are different from those of students in each of the other faculties at a statistically significant level (F sig. = .000). In addition, differences between Glendon College and Arts are statistically significant (F sig. .05). This is a particularly interesting difference as somewhat similar programs are offered by each.

Overall, differences in the size of residual scores among faculties can have one of at least three explanations. First, it is possible that, for example, the relatively high and low residual scores of Environmental Studies and Science respectively reflect lax standards in the former and high standards in the latter. Second, the differences may reflect an environment in Environmental Studies that is conducive to learning and one in Science that is relatively inimical to learning. Third, each of the foregoing may be true.

Self Assessments

As noted earlier, some studies indicate that students' self-assessments contribute to predictions of GPAs. Table 4 summarizes information on self-assessments of students entering York as collected in the Summer of 1994 survey.

A paraphrasing of specific questions focusing on self-assessments of preparation for university and competence in English can be found to the left of the table. Response options (strongly disagree = 1 to strongly agree = 5) occupy the second column. Means of residuals for each response option are found in column three.

There is a monotonic and statistically significant relationship between the extent to which students feel that they are academically prepared for university and residual scores. While the residual score for students who strongly disagreed in the Summer before first year that they were academically prepared for university is -.68, for those who strongly agreed it is .46. Similarly, students who strongly disagreed that they were emotionally prepared for university have residual scores of -.50 while those who strongly agreed scored .45. The pattern is the same when being prepared for university in terms of work habits and study skills is examined: those who strongly disagreed with this statement end up with a residual score of -.61 while those who strongly agreed scored .53. On the face of it, the self-assessments of preparation for university are borne out by residual scores: the more positive the self-assessment, the more likely that actual GPA will be greater than predicted.

When the extent to which students have energy and drive to succeed at university is examined, the results are slightly different. Although differences in residuals

Table 4: Residuals by Preparation for University (Summer '94)

		Mean of Residuals	Std Deviation	Valid N
I Feel Academically Prepared for University***	Strongly Disagree	-.68	1.92	N=41
	2	-.41	1.46	N=109
	3	-.16	1.41	N=292
	4	.17	1.18	N=441
	Strongly Agree	.46	1.24	N=312
Group Total		.08	1.34	N=1195
I Am Emotionally Prepared for University***	Strongly Disagree	-.50	1.85	N=53
	2	-.28	1.39	N=140
	3	-.09	1.40	N=283
	4	.14	1.24	N=420
	Strongly Agree	.45	1.20	N=289
Group Total		.08	1.35	N=1185
Prepared for University in Work Habits & Study Skills***	Strongly Disagree	-.61	1.72	N=81
	2	-.32	1.34	N=233
	3	.02	1.35	N=346
	4	.33	1.18	N=349
	Strongly Agree	.53	1.19	N=184
Group Total		.08	1.35	N=1193
Have Energy and Drive to Succeed at University***	Strongly Disagree	-.08	1.32	N=14
	2	-.45	1.61	N=75
	3	-.26	1.35	N=289
	4	.24	1.16	N=424
	Strongly Agree	.29	1.37	N=372
Group Total		.08	1.34	N=1174
Have No Difficulty in Speaking English***	Strongly Disagree	-.46	.95	N=11
	2	-.74	1.25	N=32
	3	-.10	1.66	N=53
	4	-.22	1.50	N=117
	Strongly Agree	.16	1.29	N=995
Group Total		.08	1.34	N=1208
I Can Read English With No Problem***	Strongly Disagree	-.12	1.28	N=5
	2	-.72	1.29	N=18
	3	-.28	1.38	N=54
	4	-.20	1.48	N=113
	Strongly Agree	.15	1.31	N=1014
Group Total		.08	1.34	N=1204
Difficult For Me to Write in English	Strongly Disagree	.12	1.31	N=871
	2	.11	1.34	N=75
	3	-.32	1.43	N=73
	4	-.08	1.63	N=68
	Strongly Agree	.11	1.24	N=99
Group Total		.08	1.34	N=1206
Can Follow Conversation in English***	Strongly Disagree	.14	1.03	N=15
	2	-.64	.98	N=11
	3	-.49	1.41	N=35
	4	-.30	1.43	N=86
	Strongly Agree	.13	1.32	N=1055
Group Total		.08	1.34	N=1202

*Sig F < .05 **Sig F < .01 ***Sig F< .001

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range from -.45 to .29 and are statistically significant, the three lowest categories (strongly disagree to 3) are not monotonic.

In order to facilitate analysis, a 'university preparation' score was calculated by summing responses to the above four items and dividing by 4 (alpha = .73; if final item were excluded, alpha drops to .68). Despite the statistically significant relationship between each item in the index and residual score, the correlation between the university preparation score and residual score was a statistically non-significant .036.

Information on the effect of students' self-assessed competency in English can also be obtained from Table 4. While students who strongly agree that they have no difficulty in speaking English have the highest mean residual score (.16), and differences in residual scores based on this variable are statistically significant, the relationship between item score and residual score is not monotonic. As a result, the best that can be said is that students who strongly agree that they have no difficulty in speaking English are more likely than others to get higher than predicted GPAs. With regard to reading English with no problem, students who strongly agree have the highest residual scores (.15) and, while differences between this and other response categories are statistically significant, the order of the remaining categories is not monotonic. When it comes to self-assessed writing ability, students who disagree that it is difficult for them to write in English have the highest residual scores (.12); however, differences between this and other categories are small, not monotonic, and not statistically significant. Finally, although statistically significant, students who strongly *disagree* that they can follow a conversation in English have the highest residual score (.14). Apart from this anomaly the relationship between the remaining response categories and residual scores is monotonic.

In view of the foregoing, it is possible to conclude that while there is some relationship between items dealing with competence in English and residual scores, the connection is neither straight forward nor particularly strong. This said, the alpha coefficient for the scale obtained by finding the mean score for the variables reading English with no problem, having difficulty writing in English (reverse order coded), and following a conversation in English, was a high .84 (it was a lower .75 with having no difficulty in speaking included). As a result, these three items were combined into a 'competence in English' index with a maximum score of 5. The correlation between the index so formed and residual scores of the difference between predicted and actual GPA was a statistically significant .121. In essence, the higher the self-assessed competence in English, the more likely that actual GPA would exceed predicted GPA.

Table 5 contains data on the relationship between residual scores and anticipated

Table 5: Residuals by Anticipated Problems (Summer, '94)

		Mean of Residuals	Std Deviation	Valid N
Satisfying Expectations of Family & Friends	Not At All Worried	.12	1.37	N=203
	2	.28	1.25	N=200
	3	.08	1.30	N=338
	4	-.03	1.34	N=277
	Very Worried	-.01	1.41	N=165
Group Total		.08	1.33	N=1183
Family Problems Interfering With Studies***	Not At All Worried	.24	1.27	N=393
	2	.12	1.32	N=253
	3	-.10	1.39	N=229
	4	-.09	1.34	N=157
	Very Worried	.01	1.37	N=95
Group Total		.08	1.33	N=1127
Having Enough Money to Meet Expenses	Not At All Worried	.22	1.26	N=129
	2	.20	1.22	N=174
	3	.01	1.27	N=233
	4	.12	1.44	N=289
	Very Worried	.02	1.35	N=370
Group Total		.09	1.33	N=1195
Being Able to Make Friends at University	Not At All Worried	.07	1.40	N=306
	2	.16	1.33	N=316
	3	.06	1.24	N=313
	4	.12	1.30	N=181
	Very Worried	-.08	1.47	N=84
Group Total		.09	1.33	N=1200
Being Able to Handle Stress	Not At All Worried	.14	1.36	N=87
	2	.01	1.30	N=201
	3	.06	1.40	N=329
	4	.23	1.23	N=339
	Very Worried	-.03	1.41	N=239
Group Total		.09	1.34	N=1195

*Sig F < .05. **Sig F < .01. ***Sig F< .001

problems as measured in the Summer 1994 survey (before the beginning of classes). With the exception of being worried that family problems would interfere with studies, there is no statistically significant relationship between anticipated problems and residual scores. For this variable, students who were not at all worried that family problems would interfere with studies had residual scores of .24 and those in category 2 scores of .12. Beyond this the order of the categories is not monotonic.

Overall, the data analysed in this section suggests that while there may be some relationship between residuals of the difference between, on the one hand, predicted and actual GPA, and, on the other hand, certain self-assessed measures of preparation for university, competence in English, and potential problems in specific areas, the connection is not strong.

Involvement Measures

Information on the relationship between residual scores and various forms of involvement is summarized in Table 6. Variables falling in the academic involvement category that were examined included: number of out-of-class contacts with faculty, teaching assistants, and staff over the previous two months (Contacts); number of non-required academic activities like attending guest lectures in the two months preceding the survey (Activities Involvement); and frequency of weekly class/tutorial/lab attendance and number of monthly visits to the library (Classroom Involvement).

Measures of social involvement included: number of clubs and/or organizations belonged to (Club Involvement); number of cultural activities participated in since the commencement of classes (Cultural Involvement); number of hours spent on campus per week (Hours on Campus); number of times campus services, such as the essay writing service, were used since the beginning of classes (Service Use); number of new friends made since September, hours per week spent with new friends, and number of monthly visits to campus pubs (Social Involvement); and participation in sports and exercise activities since September (Sports Involvement). Measures of academic and social involvement were based on the z-score, or the average z-score when a number of items were involved in variable construction.[3]

Information summarized in Table 6 indicates that of all these measures: contacts with faculty, TAs etc., and staff; sports involvement; and classroom involvement

[3]This procedure was followed because given the distributions of responses to various questions, averaging non-standardized scores would have resulted in undue emphasis being placed on certain activities.

Table 6: Correlations of Residuals With Involvement Measures (Spring, '95)

	Pearson Correlation	Sig. (2-tailed)	N
Contacts Faculty, TAs etc., Staff	-.073	.022	989
Activities Involvement	.029	.321	1196
Club Involvement	-.046	.111	1198
Cultural Involvement	-.008	.796	1186
Hours on Campus (not in residence)	.035	.271	972
Service Use	.048	.101	1194
Social Involvement	-.033	.277	1119
Sports Involvement	-.058	.046	1183
Classroom Involvement	.197	.000	1140

correlate with residuals at a statistically significant level. For contacts there is a weak correlation of -.073 with residual scores indicating that the greater the contact with professors and so on, the more likely the student is to earn a GPA that is lower than predicted. This relationship likely reflects the possibility that students are most likely to seek out-of-class assistance if they are faring poorly in their studies.

Sports involvement has a very low correlation of -.058 with residual scores. To a very limited degree the greater the involvement in sports activity the greater the likelihood of a GPA lower than predicted. By contrast, the correlation of .197 between classroom involvement and residuals indicates that the more students go to classes and lectures, and the more visits they make to the library, the greater the likelihood that their GPA will be higher than predicted.,

A final measure of involvement was the number of hours per course spent on studying outside of class. The very low correlation of -.068 between this measure and residuals suggests that the more students study, the very slightly more likely they are to earn lower than predicted grades. Perhaps in an effort to maintain a particular standing students who are doing poorly in their studies spend slightly more time on earning their grades than students who do well.

Hours of Employment

It seems reasonable to assume that students who spend a high number of hours on paid work per week (mean = 7.67, S.D. = 7.87) would have fewer hours than others to spend on course work. As a result, it might be expected that such students would earn GPAs that are lower than predicted. To a degree, this assumption is borne out by a correlation of -.071 (sig. .05) between hours of paid employment per week and residuals. The more students work in a job, the more likely it is that their GPA will be less than predicted. The size of the correlation, however, is small.

Regression Analysis

In order to obtain an overview of the impact of OAC marks and variables found to be significant in the preceding analyses on residual scores, four regression models embodying the temporal sequence discussed earlier were developed. As seen in Table 7, Model 1 includes basic demographic data and faculty of enrolment that, with the exception of racial origin, is information readily available at the beginning of first year.[4] Model 2 includes these variables as

[4]Dummy variables were created for racial origin where Black = 1, other = 0; South Asian = 1, other =0; Chinese = 1, other =0; and 'Other' origin = 1, other = 0. European origin was the reference category. For faculty of enrolment, Environmental Studies = 1,

Table 7: Beta Weights for Regression Analyses of Residuals

	Model 1	Model 2	Model 3	Model 4
OAC Marks	-.001	-.014	-.086*	-.110**
Age	-.040	-.059	-.052	-.045
Black	-.024	-.011	-.035	-.039
South Asian	.034	.021	-.006	-.014
Chinese	-.073*	-.029	-.047	-.060
Other	-.016	-.023	-.029	-.028
Env Studies	.087**	.092**	.082*	.086*
Fine Arts	.071*	.024	-.004	-.016
Admin Studies	.075*	.058	.035	.037
Science	-.202***	-.194***	-.149***	-.152***
Glendon	.088**	.074*	.053	.046
Competence in English		.049	.025	023
Family Problems Interfering With Studies		-.143***	-.092**	-.091**
Sports Involvement			-.035	-.056
Classroom Involvement			.157***	.147***
Hours Studying per Course			.021	.018
Completed Credits			.241***	.234***
Hrs. Week in Job				-.110***
Sig. F	.000	.000	.000	.000
Explained Variance	9.6%	10.5%	17.5%	18.1%
Cases	1159	965	867	857

*Sig t < .05, **Sig t < .01, ***Sig t < .001

well as students' self-assessments and anticipated problems as measured in the survey carried out in the Summer prior to the beginning of classes in 1994.[5] Model 3 adds to Model 2 involvement variables as determined in the Spring survey of 1995. Finally, Model 4 adds hours per week of work as assessed in the Spring survey to the Model 3 equation.

From Model 1 it is clear that being in Science has the greatest negative impact on residual scores (beta = -.202). In short, with other variables in Model 1 controlled, students who enter Science are likely to earn slightly lower than predicted GPAs. A negative relationship also exists between being Chinese and residual scores (beta = -.073). A positive relationship is found between being in Environmental Studies (beta = .087), Fine Arts (beta = .071), Administrative Studies (beta = .075), Glendon College (beta = .088) and residual scores. Students in each of these faculties/colleges obtain higher than expected first year GPAs. The overall variance in residual scores explained by these and other variables in Model 1 is 9.6%.

Once students' self-assessments of competence in English and the possibility of family problems affecting studies are added to the analysis, being Chinese no longer is statistically significant. Being in Environmental Studies (beta = .092) or Glendon College (beta = .074) still confers advantage in terms of residuals. More importantly, being a Science student remains a major handicap in terms of residual scores (beta = -.194). In addition, students fearing that family problems would interfere with studies (beta = -.143) receive lower than expected final grades. Despite these changes, total explained variance for Model 2 increases only from 9.6% to 10.5%.

With the inclusion of involvement variables in Model 3 a statistically significant negative relationship emerges between OAC marks and residual scores (beta = -.086). The higher the OAC mark, the less likely the achievement of the predicted grade. The advantage of Environmental Studies students (beta = .082) remains,

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other = 0; Fine Arts = 1, other = 0; Administrative Studies = 1, other = 0; Science = 1, other = 0; Glendon College = 1, other = 0. Arts was the reference category.

[5]In Table 4 it was seen that differences in mean residual scores for response options for a number of questions focusing on self-assessed preparation for university were statistically significant. When these questions were combined into a university preparation index, the correlation between the index and residual scores was not statistically significant. As a result, the university preparation index was not included in the regression analysis. In a separate analysis (not shown) in which each of the questions comprising the index was utilized in Model 2, none of the individual self-assessed university preparation variables was statistically significant.

and so do the disadvantages of being a Science student (beta = -.149) and fearing that family problems would interfere with studies (beta = -.092). Students with high levels of classroom involvement are more likely than others to earn greater than predicted marks (beta = .157) as are students who earn large numbers of credits (beta = .241). It must be assumed, however, that completing a large number of credits does not cause students to earn greater than predicted marks. Rather, the factor that explains high completion rates in part also explains higher than predicted marks. The addition of the involvement variables in Model 3 increases the explained variance from 10.5% to 17.5%.

Finally, the addition of hours per week in a job, apart from changing the magnitude of some of the beta coefficients, leaves Model 3 more or less intact; however, there is a negative relationship between hours per week in a job and residual scores (-.110). The explained variance increases from 17.5% to 18.14% with the addition of this variable.

To conclude, beginning with positive predictors, we can see from Model 4 that number of completed credits is the single best predictor of earning higher than expected marks in first year; however, as noted above, it is unlikely that completed credits causes high residual scores. Instead, the same factor (intelligence? personality?) that explains the number of credits completed likely also accounts in part for residual scores. Classroom involvement is the next best predictor. Simply put, the more students go to class and tutorials, and the more they visit the library, the more likely they are to score better than predicted GPAs. Also, Environmental Studies students in general receive higher than predicted first year marks.

As for negative predictors, the higher students' OAC marks, the less likely they are to earn better than predicted GPAs. This is an unanticipated and inexplicable finding. Perhaps better students are more involved in the activities under consideration and once adjustments are made for the latter the negative impact of OAC marks on residual scores becomes manifest. To make this hypothesis plausible it is necessary also to assume that university marking schemes make it especially difficult for students who achieve high OAC marks to equal their high school records in university.[6] Being enroled in Science also results in lower than expected marks. Finally, both fearing that family problems will interfere with studies and working contributes to lower than expected GPAs.

In order to gain a better understanding of the relationship between average OAC marks and residual scores an analysis of covariance was carried out. For this procedure, students were divided into two equal groups on the basis of their

[6]The effect may also reflect regression toward the mean.

OAC marks. Average OAC marks of the first group were 79.67% (50% of the students in the study). The second group comprised students with average OAC marks greater than 79.67% (also 50% of the sample). After adjustments were made for the variables found to be statistically significant in Model 4, the mean residual scores for the first and second groups were .18 and -.18 respectively. In essence, for students with OAC averages of 79.67% or lower GPAs were .18 higher than predicted; for students with OAC averages higher than 79.67% GPAs were .18 lower than predicted. Among possible explanations for this phenomenon is the possibility of grade inflation in high school averages in excess of 79.67%.

Conclusions

Although in the province there is a growing sentiment in favour of standardized tests in high schools, the preceding analysis demonstrates that overall traditional measures such as OAC marks are as good a predictor of first year GPA at York as at other institutions where the relationship has been studied. (Indeed, at York, the amount of variance in GPA explained by OAC marks is as high as the variance explained in some studies by both high school marks and the results of standardized tests such as SATs.) There are, however, important differences by faculty. OAC marks have the greatest and least utility in predicting first year grades in Science and Administrative Studies respectively. It must be cautioned, however, that an examination of the total population of first year students might yield results slightly different from those based on the sample chosen for this study.

When differences between predicted and actual GPAs are examined, consistent with research carried out in the United States, a number of traditional and non-traditional predictors of GPA are found to be important in explaining residual scores. The higher the OAC marks, the greater the belief at the beginning of the year that family problems would interfere with studies, and the more hours spent in employment per week, the greater the likelihood of getting lower than predicted marks. Being in Science also results in lower than predicted GPAs.

By contrast, Environmental Studies students achieve higher than predicted first year GPAs. Similarly, students are likely to have GPAs that are higher than predicted if they have high levels of classroom involvement. Although the number of completed credits also is a positive predictor of residual scores, it is likely that the same factor that explains the number of completed credits also in part contributes to high residual scores.

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